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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Downscaling surface wind predictions from numerical weather prediction models in complex terrain with WindNinja" *by* N. S. Wagenbrenner et al.

Anonymous Referee #2

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The authors compare different WRF simulations and a diagnostic model against wind observations over an isolated mountain. Spacial emphasis is given to quantify the added value of downscaling the WRF simulations with the diagnostic model (WindNinja). The topic is relevant to progress in our understanding of the ability of mesoscale simulations, and diagnostic models, to reproduce the wind over complex terrain. The observational dataset is quite unique. The article is well written and the conclusions are supported by the results. Perhaps it could be highlighted that none of the WRF simulations is able to represent the mountain. Only the simulation at 1.33 km of horizontal resolution starts to "see" something (fig. 1). More specific comments, all of them of minor character, are provided below.

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I therefore recommend acceptance of the manuscript pending to minor revisions

SPECIFIC COMMENTS

1. Page 5, line 9: Please define the FDM acronym.

2. Page 5, line 25: I believe you are using the Kain-Fritsch scheme to represent the cumulus in WRF. If so, please update the reference.

3. Page 6, line 4: The first model level of WRF-UWis 40m a.g.l. Later in the manuscript it is mentioned that these winds are interpolated to 3 m using a log profile. Is this interpolation taking into account the atmospheric stability? Or the atmosphere is assumed to be neutral? I say this because the target height, 3 m a.g.l, is far from 40 m a.g.l. and the interpolation method could play a major role in the evaluation.

4. Page 7, line 7: The NAM model has the first level at 200 m and the horizontal resolution is 12 km. NAM is obviously not representing the mountain at all. RAP provides information of the winds in the valley. It would be informative to have some discussion of this here pointing out why NAM is used even though the mountain is not represented at all.

5. Page 13: liens 11-15: None of the WRF simulations have enough horizontal resolution to represent the mountain. Only at 1.3 km WRF starts to see something. The WRF predictability probably comes from the simulation of the flow in the Snake River Plain. It may be interesting to compute anomalies with respect to the mean flow and compare them with the equivalent observations to see if there is any benefit as a result of increasing the horizontal resolution.

6. Page 14: It will be good to show a spatial plot showing the under prediction of windward and ridge top locations.

7. Page 18, first paragraph Summary: You should mention that the horizontal resolutions are too coarse to represent the mountain in the WRF simulations.

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